Name Key Date

Review of Determinants

Solve each system using Cramer's Rule.

1. $2a + 3b = 6$
   $2a + b = -2$

$D = \begin{vmatrix} 2 & 3 \\ 2 & 1 \end{vmatrix} = -4$

$D_a = \begin{vmatrix} 6 & 3 \\ -2 & 1 \end{vmatrix} = 12$

$D_b = \begin{vmatrix} 2 & 6 \\ 2 & -2 \end{vmatrix} = -16$

$a = -3$, $b = 4$

2. $3x - 4y = 2$
   $4x - 3y = 12$

$D = \begin{vmatrix} 3 & -4 \\ 4 & -3 \end{vmatrix} = 7$

$D_x = \begin{vmatrix} 2 & -4 \\ 12 & -3 \end{vmatrix} = +42$ (*48, −6)

$D_y = \begin{vmatrix} 3 & 2 \\ 4 & 12 \end{vmatrix} = 28$ (−8, 36)

$x = 6$, $y = 4$

3. $3x - 5y = 10$
   $-12x + 20y = -40$

$D = \begin{vmatrix} 3 & -5 \\ -12 & 20 \end{vmatrix} = 0$ (−60, 60)

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4. $a + b + 5c = 2$
   $3a + b + 2c = 3$
   $4a + 2b - c = -3$

$D = \begin{vmatrix} 1 & 1 & 5 \\ 3 & 1 & 2 \\ 4 & 2 & -1 \end{vmatrix} = 16$

$D_a = \begin{vmatrix} 2 & 1 & 5 \\ 3 & 1 & 2 \\ -3 & 2 & -1 \end{vmatrix} = 32$

$D_b = \begin{vmatrix} 1 & 2 & 5 \\ 3 & 3 & 2 \\ 4 & -3 & -1 \end{vmatrix} = -80$

$D_c = \begin{vmatrix} 1 & 1 & 2 \\ 3 & 1 & 3 \\ 4 & 2 & -3 \end{vmatrix} = 16$

$(2, -5, 1)$

$D_y = \begin{vmatrix} 1 & 5 & -1 \\ 2 & 12 & -1 \\ 1 & -13 & -3 \end{vmatrix} = 14$

$D = \begin{vmatrix} 1 & 3 & -1 \\ 2 & 5 & -1 \\ 1 & -2 & -3 \end{vmatrix} = 7$

$D_x = \begin{vmatrix} 5 & 3 & -1 \\ 12 & 5 & -1 \\ -13 & -2 & -3 \end{vmatrix} = 21$

5. $x + 3y - z = 5$
   $2x + 5y - z = 12$
   $x - 2y - 3z = -13$

$3 + 6 - 2 = 5$

$(3, 2, 4)$

12 cm →

Expand by minors to evaluate the determinant. Show work!

6. $\begin{vmatrix} -2 & 3 & 1 \\ 0 & -4 & 3 \\ 2 & 5 & -1 \end{vmatrix}$

$4 \begin{vmatrix} -2 & 1 \\ 2 & -1 \end{vmatrix} + 3 \begin{vmatrix} -2 & 3 \\ 2 & 5 \end{vmatrix}$ (−6, −10)

0 $\quad -48$

7. $\begin{vmatrix} 2 & -4 & 1 \\ 3 & 0 & 9 \\ -1 & 5 & 7 \end{vmatrix}$

$-3 \begin{vmatrix} -4 & 1 \\ 5 & 7 \end{vmatrix} - 9 \begin{vmatrix} 2 & -4 \\ -1 & 5 \end{vmatrix}$ (−9, −4; −28, 10)

$99 \quad -36 \quad 54$

~~63~~ $\quad 45$

8. $\begin{vmatrix} 0 & -4 & 0 \\ 2 & -1 & 1 \\ 3 & -2 & 5 \end{vmatrix}$

$- -4 \begin{vmatrix} 2 & 1 \\ 3 & 5 \end{vmatrix}$

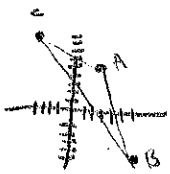
$4 \cdot 7$

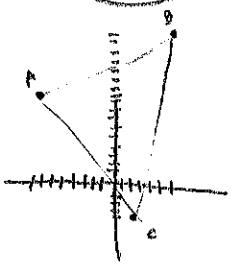
28

9. $\begin{vmatrix} 2 & 1 & 0 \\ 1 & 8 & 0 \\ 0 & 5 & 1 \end{vmatrix}$

$+ -1 \begin{vmatrix} 2 & 1 \\ 1 & 8 \end{vmatrix}$

-15





Use determinants to find the area given the coordinates.

10. (3, 5), (6, -5), (-4, 10)

$\frac{1}{2}\left(\begin{vmatrix} 3 & 5 \\ 6 & -5 \end{vmatrix} + \begin{vmatrix} 6 & -5 \\ -4 & 10 \end{vmatrix} + \begin{vmatrix} -4 & 10 \\ 3 & 5 \end{vmatrix} \right)$

$-45 + 40 + -50$

$\frac{1}{2}(-55)$

27.5 units^2

11. (-8, 10), (6, 17),(2, -4)

$\frac{1}{2}\left(\begin{vmatrix} -8 & 10 \\ 6 & 17 \end{vmatrix} + \begin{vmatrix} 6 & 17 \\ 2 & -4 \end{vmatrix} + \begin{vmatrix} 2 & -4 \\ -8 & 10 \end{vmatrix} \right)$

$-196 \quad -58 \quad -12$

$\frac{1}{2}(-266)$

133 units^2

Can you multiply the following matrices? If so what would the dimensions be?

12. $A_{3x4}\ B_{4x8}$ AB 3×8

13. $C_{6x3}\ D_{3x2}$ CD 6×2

14. $E_{9x2}\ F_{9x4}$ NO

15. $G_{3x1}\ H_{1x8}$ GH 3×8